Rear view of the system

Figure 3. 3 x PCIe Low-Profile Slots with 4 x 3.5-inch SAS/SATA or 4 x 2.5-inch NVMe Drives

Figure 4. 2 x PCIe Low-Profile Slots + 4 x 3.5-inch SAS/SATA Drives with 1 CPU

Figure 5. 5 x PCIe Low-Profile Slots

Figure 6. 3 x PCIe Low-Profile Slots with 1 CPU

Figure 7. 5 x PCIe Low-Profile Slots + 2 x 2.5-inch NVMe Drives

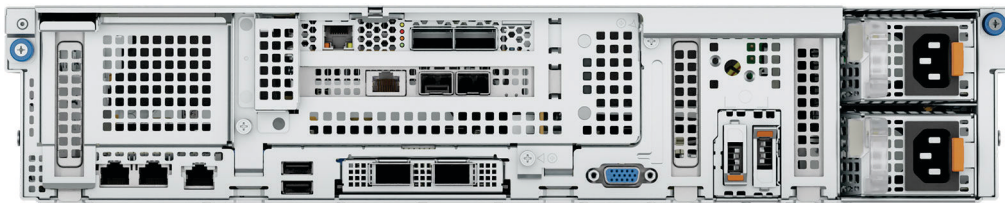**Figure 8. 3 x PCIe Low-Profile Slots + 2 x 2.5-inch NVMe Drives with 1 CPU**

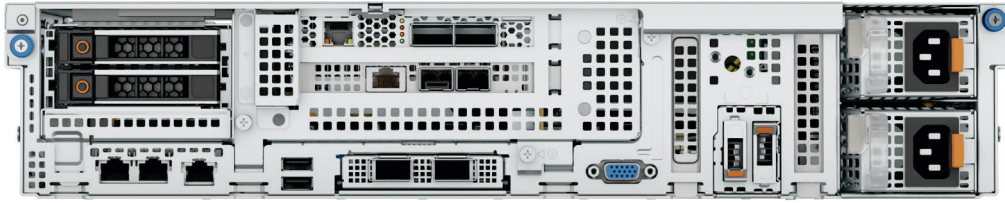**Figure 9. 3 x PCIe Low-Profile Slots + 2 x PCIe FH/FL Slots**

Figure 10. 2 x PCIe Low-Profile Slots + 2 x PCIe x16 FH/FL Slots + 2 x 2.5-inch NVMe Drives
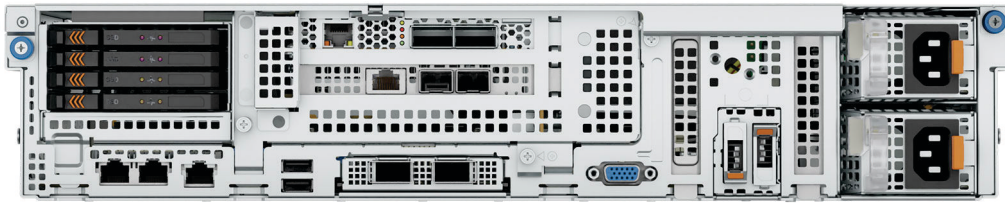

Figure 11. 2 x PCIe Low-Profile Slots + 2 x PCIe x16 FH/FL Slots + 4 x E3.S NVMe Drives

Figure 12. 5 x PCIe Low-Profile Slots + 4 x E3.S NVMe Drives

Inside the system

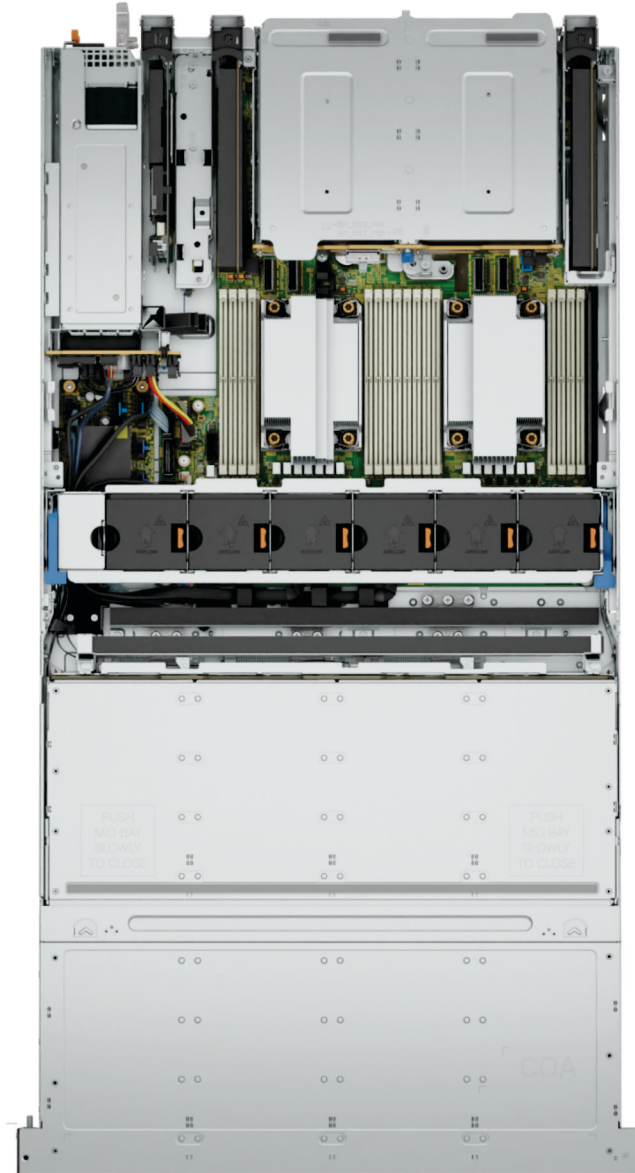Figure 13. 3 x PCIe Low-Profile Slots with 4 x 3.5-inch SAS/SATA or 4 x 2.5-inch NVMe Drives
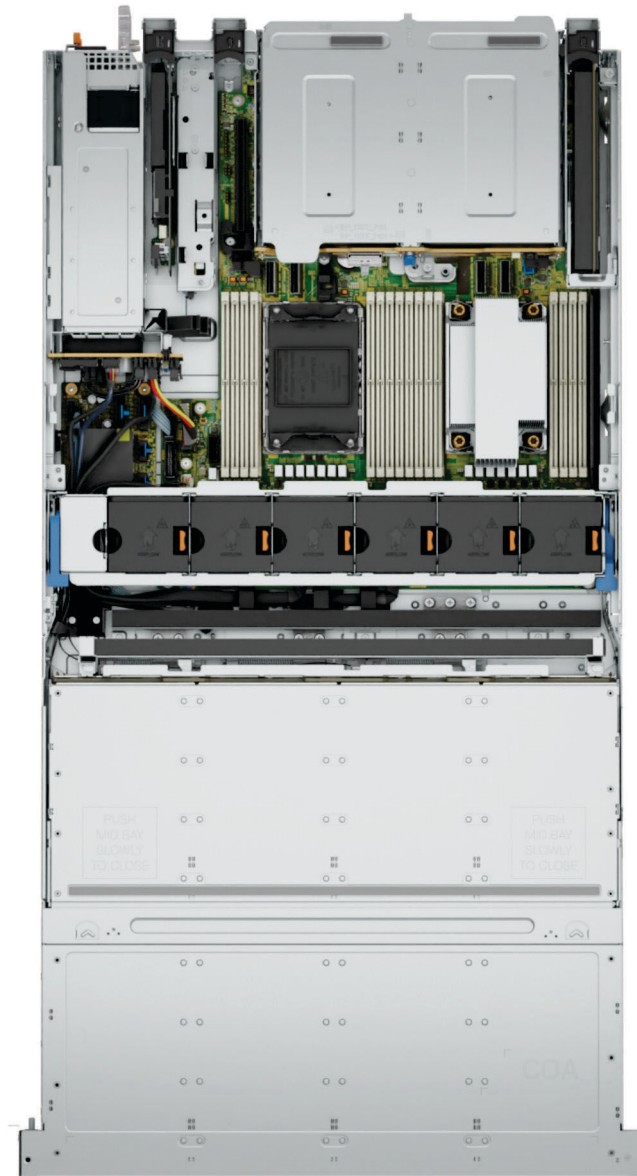
Figure 14. 2 x PCIe Low-Profile Slots + 4 x 3.5-inch SAS/SATA Drives with 1 CPU
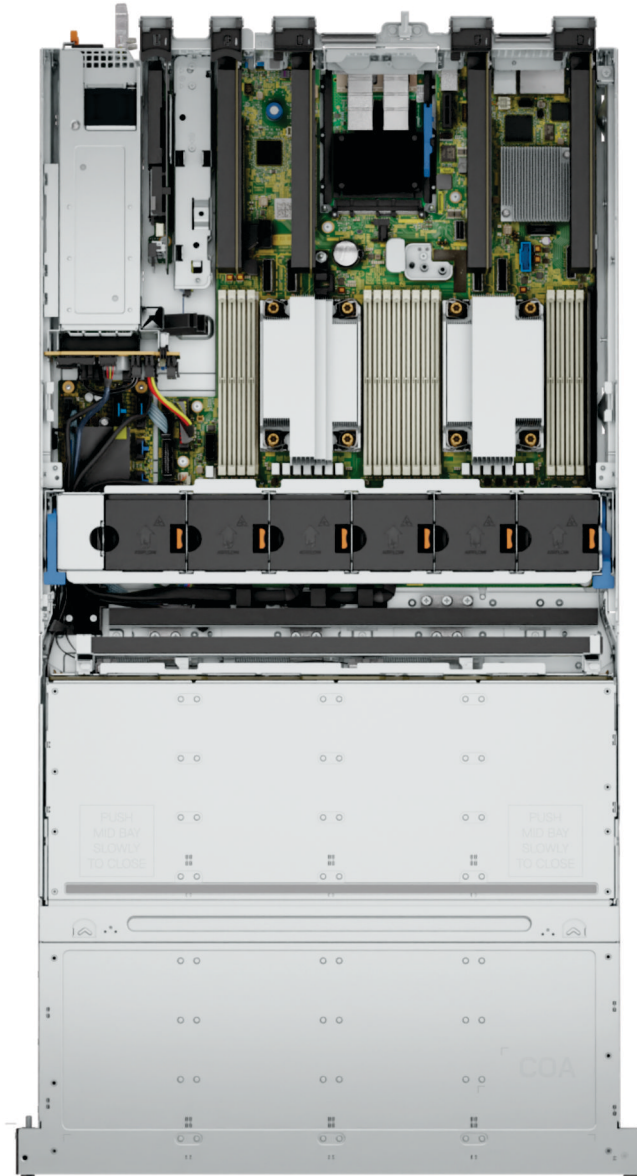
Figure 15. 5 x PCIe Low-Profile Slots

Figure 16. 3 x PCIe Low-Profile Slots with 1 CPU

Figure 17. 5 x PCIe Low-Profile Slots + 2 x 2.5-inch NVMe Drives

Figure 18. 3 x PCIe Low-Profile Slots + 2 x 2.5-inch NVMe Drives with 1 CPU

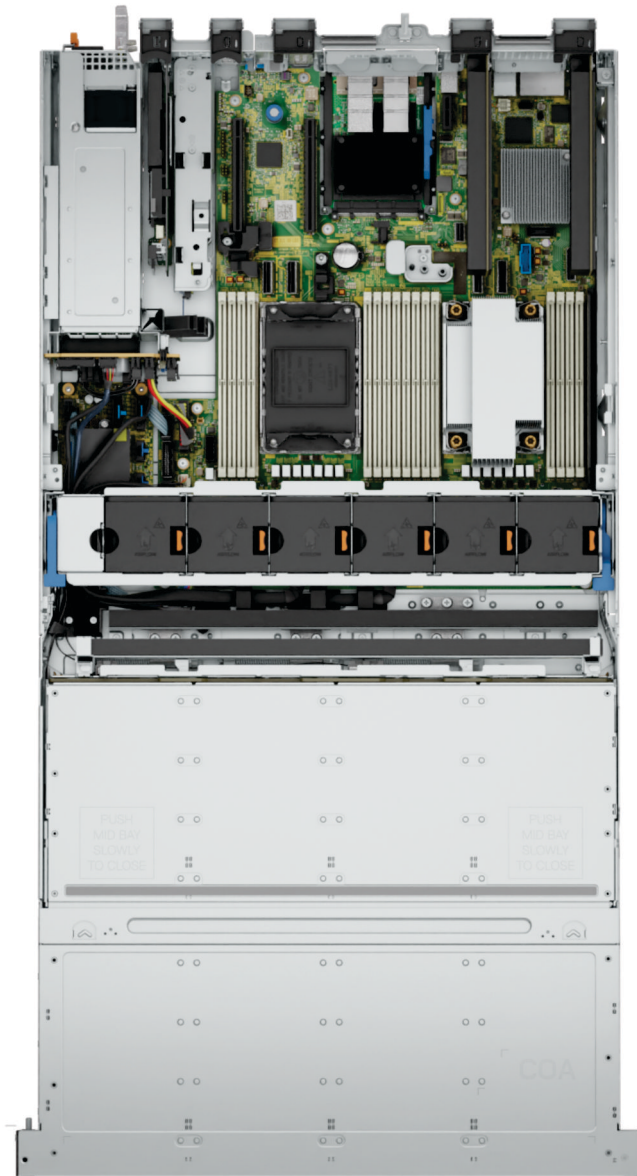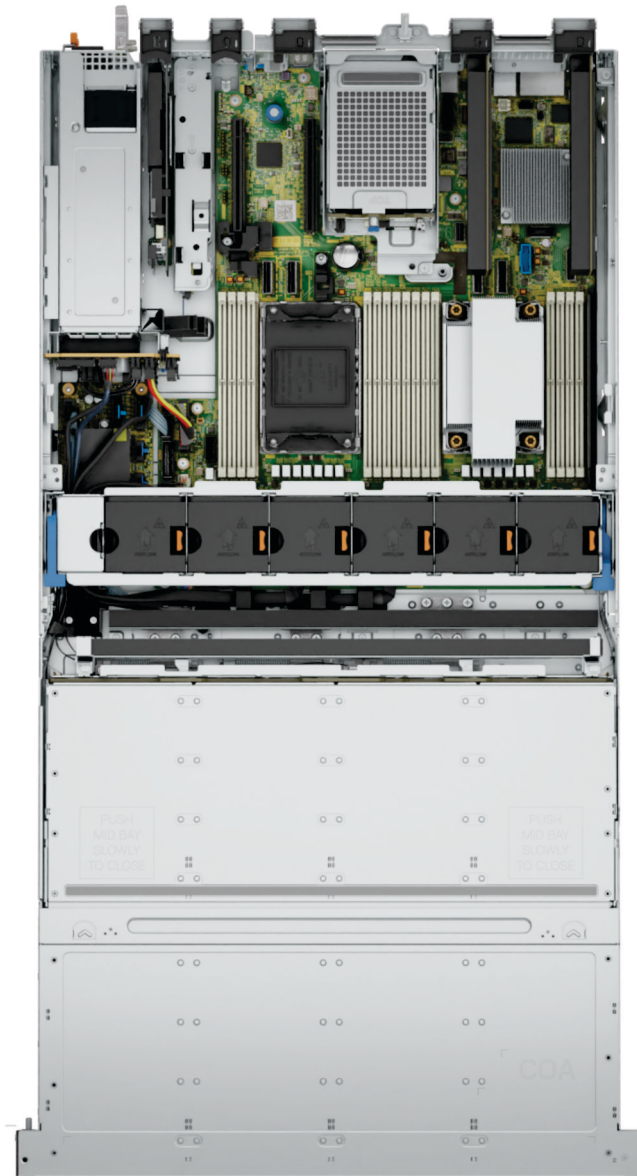**Figure 19. 3 x PCIe Low-Profile Slots + 2 x PCIe FH/FL Slots**
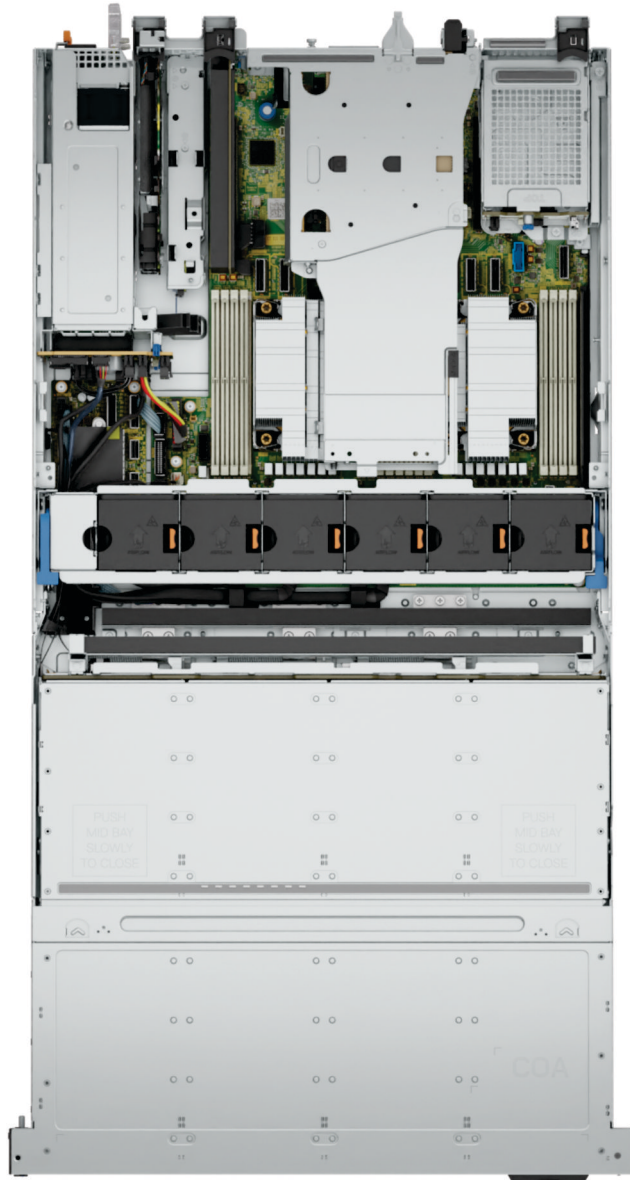
Figure 20. 2 x PCIe Low-Profile Slots + 2 x PCIe x16 FH/FL Slots + 2 x 2.5-inch NVMe Drives

Figure 21. 5 x PCIe Low-Profile Slots + 4 x E3.S NVMe Drives
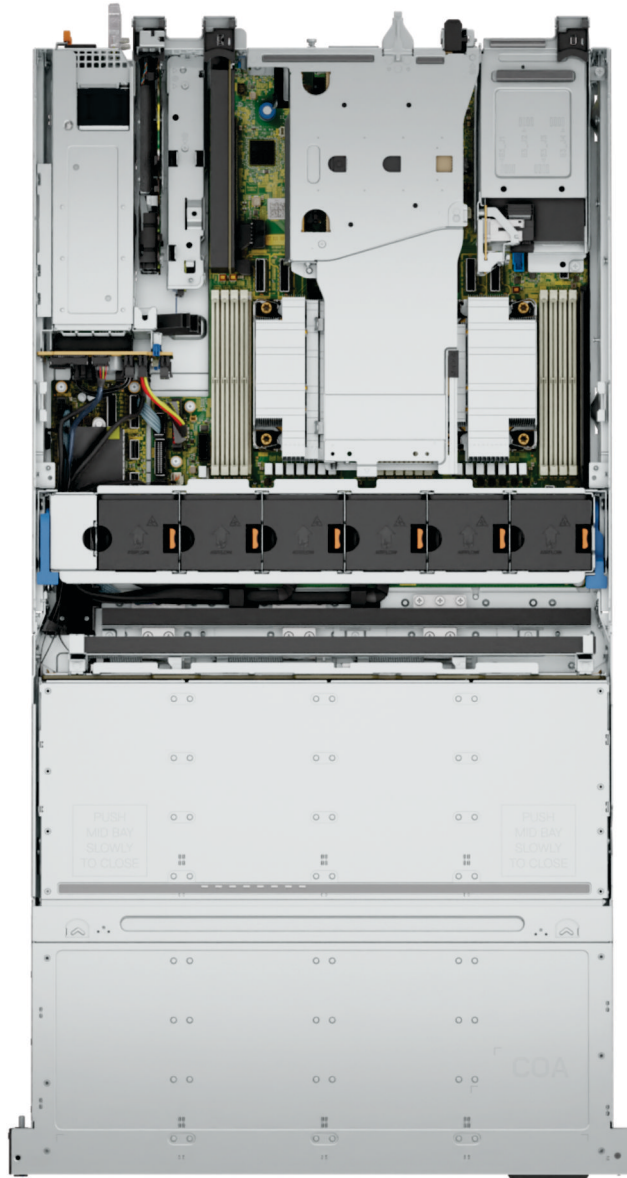
Figure 22. 2 x PCIe Low-Profile Slots + 2 x PCIe x16 FH/FL Slots + 4 x E3.S NVMe Drives

Quick Resource Locator

The QRL on everything (SILs, GSG, Owner's Manual except on the EST) is a generic QRL for R760xd2 that leads to a webpage for that product. That webpage has links for things like setup and service videos, iDRAC manual, and other things that apply to the platform. The QRL on the EST is unique and specific to that service tag and will contain the Service Tag number and the iDRAC password. The label and the QRL code within it are printed on demand at the L10 factories. This QRL links to a webpage that shows the exact configuration as built for that customer, and the specific warranty purchased. It is one click away from the same content of generic information that applies to R760xd2 that is available in the other QRLs.

Figure 23. Quick Resource Locator for PowerEdge R760xd2 system

Processor

Topics:

Processor features

The 4th Generation Xeon® Scalable Processors stack is the next generation data center processor offering with significant performance increases, integrated acceleration, and next generation memory and I/O. Sapphire Rapids accelerate customer usages with unique workload optimizations.

The following lists the features and functions that are in the upcoming 4th Generation Intel® Xeon Scalable Processor offering:

- Faster UPI with up to three Intel Ultra Path Interconnect (Intel UPI) at up to 16 GT/s, increasing multisocket bandwidth.
- More, faster I/O with PCI Express Gen4 and up to 80 lanes (per socket)
- Enhanced Memory Performance with DDR5 support and memory speed up to 4800 MT/s in one DIMM per channel (1DPC).
- New built-in accelerators for data analytics, networking, storage, crypto, and data compression

Supported processors

Table 3. Supported processors for R760xd2

Processor	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
6428N	1.8	60	16	32	64	Turbo	4800	6TB	185 W
6426Y	2.6	38	16	16	32	Turbo	4800	6TB	185 W
5418Y	2	45	16	24	48	Turbo	4400	6TB	185 W
5418N	1.8	45	16	24	48	Turbo	4400	6TB	165 W
5416S	2	30	16	16	32	Turbo	4400	6TB	150 W
5415+	2.9	23	16	8	16	Turbo	4400	6TB	150 W
5412U	2.1	45	16	24	48	Turbo	4400	6TB	185 W
5411N	1.9	45	16	24	48	Turbo	4400	6TB	165 W
4416+	2	38	16	20	40	Turbo	4000	6TB	165 W
4410Y	2	30	16	12	24	Turbo	4000	6TB	150 W
3408U	1.8	23	16	8	16	No Turbo	4000	6TB	125 W

Memory subsystem

The PowerEdge XR8610t and XR8620t supports up to 8 DIMMs, with up to 512 GB of standard memory and speeds of up to 4800 MT/s.

Topics:

*   Supported memory

Supported memory

Table 4. Memory technology

Feature	PowerEdge R760xd2 (DDR5)
DIMM type	RDIMM
Transfer speed	4800 MT/s
Voltage	1.1 V

The following table lists the supported DIMMs for R760xd2. For the latest information on supported memory and memory configurations reference the latest SDL.

Table 5. Supported DIMMs

Rated DIMM Speed (MT/s)	DIMM Type	DIMM Capacity (GB)	Ranks per DIMM	Data Width	DIMM Volts
4800	RDIMM	16	1	8	1.1
4800	RDIMM	32	2	8	1.1
4800	RDIMM	64	2	4	1.1

Storage

Topics:

Storage controllers

Dell's RAID controller options offer performance improvements, including the Adapter PERC solution. Adapter PERC provides a base RAID HW controller without consuming a PCIe slot by using a small form factor and high-density connector to the base planar

Table 6. PERC Series controller offerings

Performance Level	Controller and Description
Entry	NA
Value	HBA355i Adapter (Internal)
Value Performance	H755 Adapter, H355 Adapter, H965i Adapter
External Controllers	HBA355e, H965e

(i) **NOTE:** For more information on the features of the Dell PowerEdge RAID controllers (PERC), Software RAID controllers, or BOSS card, and on deploying the cards, see the storage controller documentation at www.dell.com/storagecontrollermanuals.

(i) **NOTE:** From December 2021, H355 will replace H345 as the entry raid controller. H345 will be deprecated in January 2022.

Storage controller feature matrix

Table 7. Storage controller feature matrix

Model & Form Factors	Interface Support	PCI Support	SAS Connection	Cache Memory Size	Write Back Cache	RAID Levels	Max Drive Support	RAID Support
PowerEdge Server-Storage Controllers (PERC) Series 12								
H965i Adapter	24Gb/s SAS 6Gb/s SAS/SATA Gen3 (8 GT/s) NVMe Gen4 (16 GT/s) NVMe	PCIe Gen 4	16 ports/lanes - 2x8 Internal	8GB NV	Flash Backed Cache	0,1,5,6,10,50,60	16	Hardware
H965e Adapter	24Gb/s SAS 6Gb/s SAS/SATA	PCIe Gen 4	16 ports/lanes - 2x8 Internal	8GB NV	Flash Backed	0,1,5,6,10,50,60	16	Hardware

Table 7. Storage controller feature matrix (continued)

Model & Form Factors	Interface Support	PCI Support	SAS Connection	Cache Memory Size	Write Back Cache	RAID Levels	Max Drive Support	RAID Support
	Gen3 (8 GT/s) NVMe Gen4 (16 GT/s) NVMe				Cache			
PowerEdge Server-Storage Controllers (PERC & SAS HBA) Series 11								
H755 Adapter	12Gb/s SAS 6Gb/s SAS/SATA 3Gb/s SAS/SATA Gen3 (8 GT/s) NVMe Gen4 (16 GT/s) NVMe	PCIe Gen 4	16 ports- 2x8 Internal	8GB NV	Flash Backed Cache	0,1,5,6,10,50,60	16/ controller 50 with SAS Expander	Hardware
HBA355i Adapter	12Gb/s SAS 6Gb/s SAS/SATA 3Gb/s SAS/SATA	PCIe Gen 4	16 ports- 2x8 Internal	N/A	N/A	N/A	16/ controller 50 with SAS Expander	N/A
HBA355e Adapter	12Gb/s SAS 6Gb/s SAS/SATA 3Gb/s SAS/SATA	PCIe Gen 4	16 ports- 4x4 external	N/A	N/A	N/A	240	N/A
H355 Adapter	12Gb/s SAS 6Gb/s SAS/SATA	PCIe Gen 4	16 ports- 2x8 Internal	No Cache	No Cache	0,1, 10	Up to 32 RAID, or 32 Non- RAID	Hardware

ⓘ **NOTE:**
1. RAID 5/50 removed from entry RAID card
2. SWRAID support for Linus provides a pre-boot configuration utility to configure MDRAID and degraded boot capability.
3. For information, post-RTS, see the Storage controller documentation at www.dell.com/stroagecontrollermanuals.

This document is updated as changes happen, so for the latest version be sure to bookmark it rather than downloading an offline copy or refer to the Storage Controller Matrix on sales portal.

Supported Drives

The table shown below lists the internal drives supported by the R760xd2. Refer to Agile for the latest SDL.

Table 8. Supported Drives

Form Factor	Type	Speed	Rotational Speed	Capacities
2.5 inches	NVMe	Gen4	SSD	1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 6.4 TB, 7.68 TB
	DC NVMe	Gen4	SSD	960 GB, 3.84 TB
	vSAS	12 Gb	SSD	960 Gb, 1.92 TB, 3.84 TB, 7.68 TB
	SAS	24 Gb	SSD	800 Gb, 1.6 TB, 1.92 TB, 3.84 TB, 7.68 TB

Table 8. Supported Drives (continued)

Form Factor	Type	Speed	Rotational Speed	Capacities
	SATA	6 Gb	SSD	480 Gb, 960 Gb, 1.6 TB, 1.92 TB, 3.84 TB, 7.68 TB
	SAS	12 Gb	10 K	600 GB, 1.2 TB, 2.4 TB
3.5 inches	SAS	12 Gb	7.2 K	2 TB, 4 TB, 8 TB, 12 TB, 16 TB, 20 TB, 22 TB
	SATA	6 Gb	7.2 K	2 TB, 4 TB, 8 TB, 12 TB, 16 TB, 20 TB, 22 TB
E3.S	NVMe	Gen5	SSD	3.84 TB, 7.68 TB

Internal storage configuration

R760xd2 supports the following internal storage configurations:
- 2 x 12 x 3.5 inch SAS/SATA RAID
- 2 x 12 x 3.5 inch SAS/SATA RAID with rear 4 x 3.5 inch SAS/SATA
- 2 x 12 x 3.5 inch SAS/SATA RAID with rear 4 x 2.5 inch NVMe
- 2 x 12 x 3.5 inch SAS/SATA RAID with rear 2 x U.2 NVMe
- 2 x 12 x 3.5 inch SAS/SATA RAID with rear 4 x E3.S NVMe

External Storage

The R760xd2 support the external storage device types listed in the table below.

Table 9. Supported External Storage Devices

Device Type	Description
External Tape	Supports connection to external USB tape products
NAS/IDM appliance software	Supports NAS software stack
JBOD	Supports connection to 12Gb MD-series JBODs

Networking

Topics:

Overview

PowerEdge offers a wide variety of options to get information moving to and from our servers. Industry best technologies are chosen, and systems management features are added by our partners to firmware to tie in with iDRAC. These adapters are rigorously validated for worry-free, fully supported use in Dell servers.

OCP 3.0 support

Table 10. OCP 3.0 feature list

Feature	OCP 3.0
Form factor	SFF
PCIe Gen	Gen4
Max PCIe width	x8
Max no.of ports	4
Port type	BT/SFP/SFP+/SFP28/SFP56
Max port speed	100 GbE
NC-SI	Yes
SNAPI	Yes
WoL	Yes
Power consumption	15 W - 150 W

Supported OCP cards

Table 11. The below table lists the supported OCP in R760xd2

Form factor	Vendor	Port type	Port speed	Port count
OCP 3.0	Broadcom	BT	1 GbE	4 Port
	Broadcom	BT	1 GbE	4 Port
	Intel	BT	1 GbE	4 Port
	Broadcom	BT	10 GbE	2 Port
	Broadcom	BT	10 GbE	4 Port
	Intel	BT	10 GbE	2 Port

Table 11. The below table lists the supported OCP in R760xd2 (continued)

Form factor	Vendor	Port type	Port speed	Port count
	Intel	BT	10 GbE	4 Port
	Intel	BT	10 GbE	4 Port
	Mellanox	SFP28	25 GbE	2 Port
	Broadcom	SFP28	25 GbE	2 Port
	Broadcom	SFP28	25 GbE	4 Port
	Intel	SFP28	25 GbE	2 Port
	Intel	SFP28	25 GbE	4 Port

OCP NIC 3.0 vs. rack Network Daughter Card comparisons

Table 12. OCP 3.0, 2.0, and rNDC NIC comparison

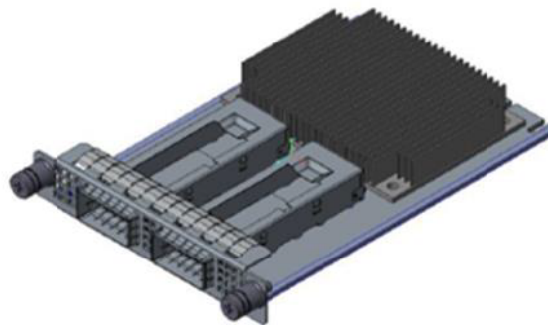| Form Factor	Dell rNDC	OCP 2.0 (LOM Mezz)	OCP 3.0	Notes
PCIe Gen	Gen 3	Gen 3	Gen 4	Supported OCP3 are SFF (small form factor)
Max PCIe Lanes	x8	Up to x16	Up to x16	See server slot priority matrix
Shared LOM	Yes	Yes	Yes	This is iDRAC port redirect
Aux Power	Yes	Yes	Yes	Used for Shared LOM

OCP form factors

Figure 24. OCP 3.0 Small Card Form Factor (LS)

The process of removing the OCP card in R760xd2 system:

1. Open the blue latch to unlock the OCP card.
2. Push the OCP card towards the rear end of the system to disconnect from the connector on the system board.
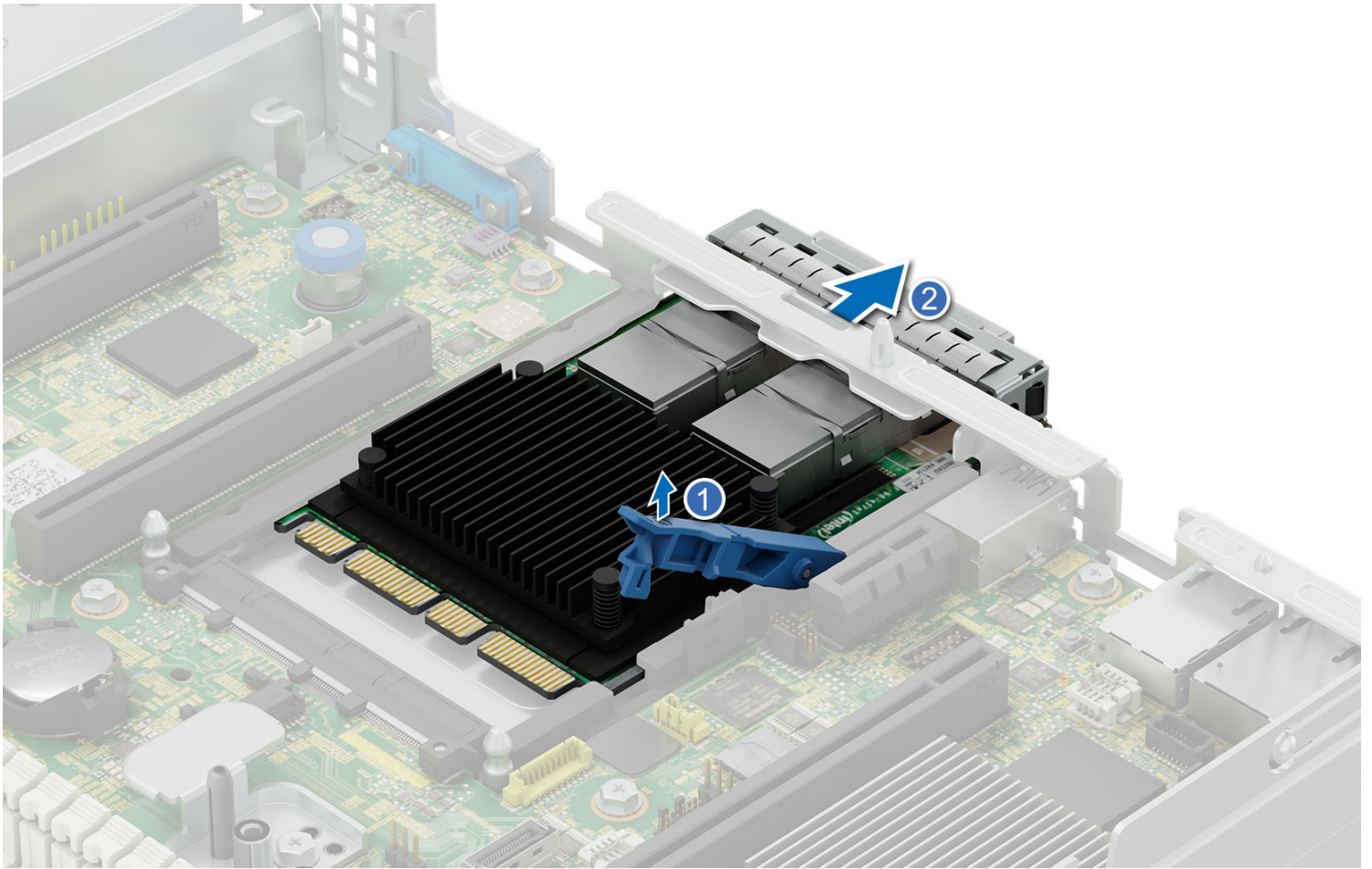3. Slide the OCP card out of the slot on the system.

Figure 25. Removing the OCP Card in R760xd2

The process of installing the OCP card in R760xd2 system:

1. Open the blue latch on the system board.
2. Slide the OCP card into the slot in the system.
3. Push until the OCP card is connected to the connector on the system board.
4. Close the latch to lock the OCP card to the system.

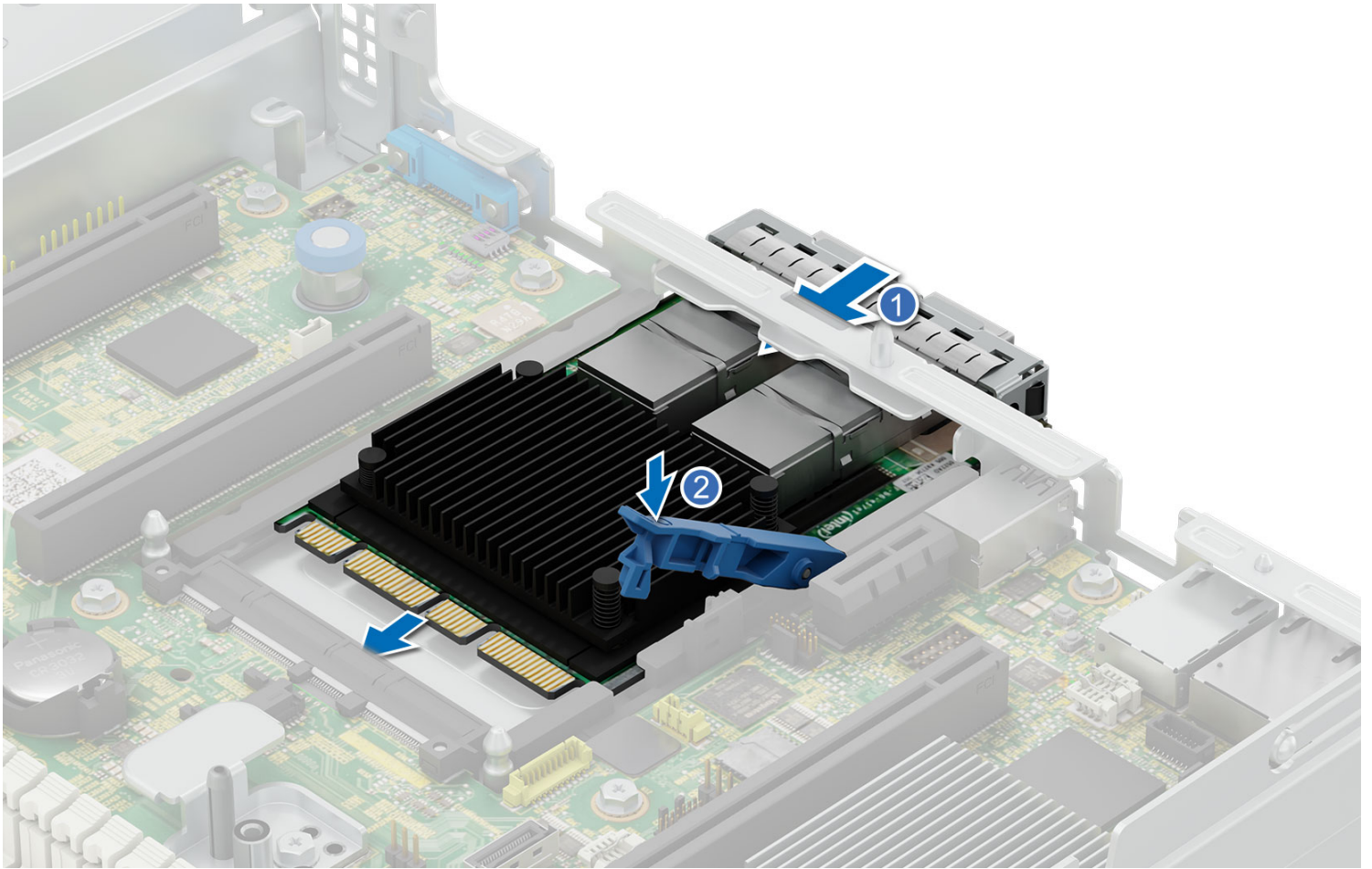**Figure 26. Installing the OCP Card in R760xd2**

PCIe subsystem

Topics:

*   PCIe risers

PCIe risers

Shown below are the riser offerings for the platform. For a full list of supported cards and Slot priority, please see the Slot Priority Matrix - found in the Agile tool (P/N:R20W5)
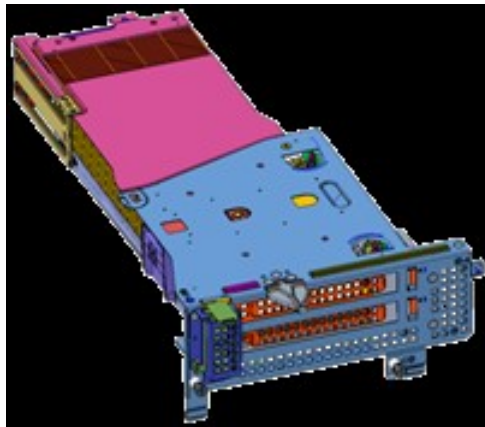
Figure 27. Riser Offerings

Figure 28. Config 3 FH FL Riser

Figure 29. Config 3 FH HL Riser

Power, thermal, and acoustics

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps to regulate temperature by reducing server noise and power consumption. The table below lists the tools and technologies Dell offers to lower power consumption and increase energy efficiency.

Topics:

Power

Table 13. Power tools and technologies

Feature	Description
Power Supply Units(PSU) portfolio	Dell's PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. Find additional information in the Power supply units section.
Tools for right sizing	Enterprise Infrastructure Planning Tool (EIPT) is a tool that can help you determine the most efficient configuration possible. With Dell's EIPT, you can calculate the power consumption of your hardware, power infrastructure, and storage at a given workload. Learn more at www.dell.com/calc.
Industry Compliance	Dell's servers are compliant with all relevant industry certifications and guide lines, including 80 PLUS, Climate Savers and ENERGY STAR.
Power monitoring accuracy	PSU power monitoring improvements include: ● Dell's power monitoring accuracy is currently 1%, whereas the industry standard is 5% ● More accurate reporting of power ● Better performance under a power cap
Power capping	Use Dell's systems management to set the power cap limit for your systems to limit the output of a PSU and reduce system power consumption. Dell is the first hardware vendor to leverage Intel Node Manager for circuit-breaker fast capping.
Systems Management	iDRAC Enterprise and Datacenter provides server-level management that monitors, reports and controls power consumption at the processor, memory and system level. Dell OpenManage Power Center delivers group power management at the rack, row, and data center level for servers, power distribution units, and uninterruptible power supplies.
Active power management	Intel Node Manager is an embedded technology that provides individual server-level power reporting and power limiting functionality. Dell offers a complete power management solution comprised of Intel Node Manager accessed through Dell iDRAC9 Datacenter and OpenManage Power Center that allows policy-based management of power and thermal at the individual server, rack, and data center level. Hot spare reduces power consumption of redundant power supplies. Thermal control off a speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption. Idle power enables Dell servers to run as efficiently when idle as when at full workload.
Rack infrastructure	Dell offers some of the industry's highest-efficiency power infrastructure solutions, including:

Table 13. Power tools and technologies (continued)

Feature	Description
	● Power distribution units (PDUs) ● Uninterruptible power supplies (UPSs) ● Energy Smart containment rack enclosures Find additional information at: https://www.delltechnologies.com/en-us/servers/power-and-cooling.htm.

Power Supply Units

Energy Smart power supplies have intelligent features, such as the ability to dynamically optimize efficiency while maintaining availability and redundancy. Also featured are enhanced power-consumption reduction technologies, such as high-efficiency power conversion and advanced thermal-management techniques, and embedded power-management features, including high-accuracy power monitoring. The table below shows the power supply unit options that are available for the R760xd2.

Table 14. Power Supply Unit Options

Wattage	Frequency	Voltage/Current	Class	Heat dissipation
700 W	50/60 Hz	200-240 Vac/4.1 A	Titanium	2625 BTU/hr
	NA	240 Vdc/3.4 A	NA	
1100 W	50/60 Hz	100-240 Vac/12-3.6 A	Titanium	4125 BTU/hr
	NA	240 Vdc/5.2 A	NA	
1400 W	50/60 Hz	100-240 Vac/12-8 A	Platinum	5250 BTU/hr
	NA	240 Vdc/6.6 A	NA	
1800 W	50/60 Hz	200-240 Vac/10 A	Titanium	6610 BTU/hr
	NA	240 Vdc/8.2 A	NA	
1100 W DC	NA	(-48) — (-60) Vdc/ 27 A	NA	4265 BTU/hr

ⓘ **NOTE:** If a system with AC 1100W or 1400W PSUs operate at low line 100 ~ 120 Vac, then the power rating per PSU is de-rated to 1050W.

Figure 30. PSU power cord

Table 15. PSU power cords

Form factor	Output	Power cord
Redundant 60 mm	700 W	C13
	1100 W	
	1400 W	
	1100 W DC	-48Vdc connector.
	1800 W	C15

Thermal

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption.

Thermal design

Thermal management of the platform helps deliver high performance with the right amount of cooling to components, while maintaining the lowest fan speeds possible. This is done across a wide range of ambient temperatures from 10°C to 35°C (50°F to 95°F) and to extended ambient temperature ranges.
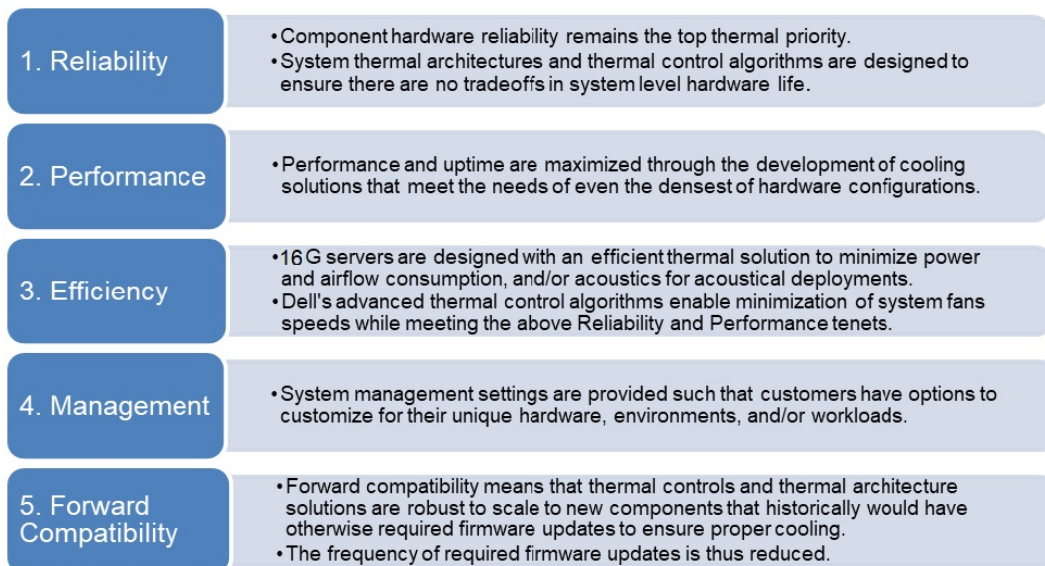
Figure 31. Thermal design characteristics

The thermal design of the PowerEdge R760xd2 reflects the following:

- Optimized thermal design: The system layout is architected for optimum thermal design.
- System component placement and layout are designed to provide maximum airflow coverage to critical components with minimum expense of fan power.
- Comprehensive thermal management: The thermal control system regulates the fan speed based on several different responses from all system-component temperature sensors, and inventory for system configurations. Temperature monitoring includes components such as processors, DIMMs, chipset, the inlet air ambient, hard disk drives, and OCP.
- Open and closed loop thermal fan speed control: Open loop thermal control uses system configuration to determine fan speed based on inlet air ambient temperature. Closed loop thermal control method uses feedback temperatures to dynamically determine proper fan speeds.
- User-configurable settings: With the understanding and realization that every customer has unique set of circumstances or expectations from the system, in this generation of servers, we have introduced limited user- configurable settings residing in the iDRAC BIOS setup screen. For more information, see the Dell PowerEdge R760 Installation and Service Manual at www.dell.com/poweredgemanuals and "Advanced Thermal Control: Optimizing across Environments and Power Goals" on Dell.com.
- Cooling redundancy: The R760 allows N+1 fan redundancy, allowing continuous operation with one fan failure in the system.
- Environmental Specifications: The optimized thermal management makes the R760 reliable under a wide range of operating environments.

Acoustics

Acoustical performance

Dell EMC PowerEdge R760xd2 is a rack server appropriate for attended data center environment. However, lower acoustical output is attainable with proper hardware or software configurations.

Table 16. Hardware and software configurations for lower acoustical output

Configuration	Quietest	Quietest GPU	Hadoop	SDS typical	SDS + acceleration
Processor Type	Intel Xeon Scalable processor	Intel Xeon Scalable processor	Intel Xeon Scalable processor	Intel Xeon Scalable processor	Intel Xeon Scalable processor
Processor TDP	185 W	185 W	185 W	150 W	185 W
Processor Quantity	1	2	2	2	2
RDIMM Memory	16 GB DDR5	16 GB DDR5	16 GB DDR5	8 GB DDR5	16 GB DDR5

Table 16. Hardware and software configurations for lower acoustical output (continued)

Configuration	Quietest	Quietest GPU	Hadoop	SDS typical	SDS + acceleration
Memory Quantity	2	2	16	8	16
Backplane Type	12 x 3.5-inch BP	12 x 3.5-inch BP	12 x 3.5-inch + 12 x 3.5-inch + Rear SSD x 2	12 x 3.5-inch + 12 x 3.5-inch + Rear 4 x 3.5 inch	12 x 3.5-inch + 12 x 3.5-inch
HDD Type	12 x 3.5 inch 8TB	12 x 3.5 inch 8TB	14 x 3.5 inch front 8 TB, 2 x 2.5 inch rear SSD	28 x 3.5 inch front 16 TB	24 x 3.5 inch 8 TB
HDD Quantity	12	12	14 + 2	28	24
Flash Drives	N/A	N/A	PCIe SSD	N/A	N/A
Flash Quantity	N/A	N/A	2	N/A	N/A
PSU Type	1100 W	1100 W	1100 W	1100 W	1100 W
PSU Quantity	2	2	2	2	2
OCP	N/A	N/A	Dual Port 10/25GbE	Dual Port 10/25GbE	Dual Port 10/25GbE
PCI 1	Intel 10 GbE	Intel 10 GbE	Intel 25 GbE	Intel 10 GbE	Intel 25 GbE
PCI 2	N/A	N/A	N/A	N/A	N/A
PCI 3	N/A	A30 GPU	N/A	H755	A30 GPU
PCI 4	N/A	HBA 355	HBA 355	HBA 355	PERC 965
PCI 5	HBA 355	N/A	N/A	N/A	N/A

Table 17. Acoustical performance of R760xd2 acoustical configurations

Configuration		Quietest	Quietest GPU	Hadoop	SDS typical	SDS + acceleration
Acoustical Performance: Idle/ Operating @ 25 °C Ambient						
$L_{wA,m}$ (B)	Idle	5.0	6.9	6.6	6.6	7.1
	Operating	5.2	7.3	6.6	6.6	7.5
K_v (B)	Idle	0.4	0.4	0.4	0.4	0.4
	Operating	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)	Idle	35	54	51	51	56
	Operating	37	58	51	51	60
Prominent tones		No prominent tones in Idle and Operating				
Acoustical Performance: Idle @ 28 °C Ambient						
$L_{wA,m}$ (B)		5.8	7.2	7.0	7.0	7.4
K_v (B)		0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)		42	58	54	55	59
Acoustical Performance: Max. Loading @ 35 °C Ambient						
$L_{wA,m}$ (B)		7.7	8.1	7.6	8.1	8.1
K_v (B)		0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)		60	66	60	66	66

LwA,m: The declared mean A-weighted sound power level (LwA) is calculated per section 5.2 of ISO 9296 (2017) with data collected using the methods described in ISO 7779 (2010). Data presented here may not be fully compliant with ISO 7779.

LpA,m: The declared mean A-weighted emission sound pressure level is at the bystander position per section 5.3 of ISO 9296 (2017) and measured using methods described in ISO 7779 (2010). The system is placed on standard test table and in a 24U rack enclosure, 25cm above a reflective floor. Data presented here may not be fully compliant with ISO 7779.

Prominent discrete tones: Criteria of Annex D of ECMA-74 & Prominence Ratio method of ECMA-418 are followed to determine if discrete tones are prominent and to report them, if so..

Idle mode: The steady-state condition in which the server is energized but not operating any intended function.

Operating mode: Operating mode is represented by the maximum of the steady state acoustical output at 50% of CPU TDP or active storage drives for the respective sections of Annex C of ECMA-74.

Customer Usage Operating mode: The operating mode is represented by the maximum of the steady state acoustical output at 0%~40% of CPU TDP, 5%~50% IOPs load, 0%~20% Memory load, and 10 0% GPU load as the components showed in the above configurations

PowerEdge acoustical specifications

For more information on acoustical specifications, see ENG0019663. (See the category definitions.)

Dell typically categorizes servers in five categories of acoustically acceptable usage:

- Category 1: Table-top in Office Environment
- Category 2: Floor-standing in Office Environment
- Category 3: General Use Space
- Category 4: Attended Data Center
- Category 5: Unattended Data Center

Category 1: Floor-standing in Office Environment

When Dell determines that a specific Enterprise product is to be used on a table-top in office environment, for example, on a desk around a seated user's head height, then the acoustical specification of the following table applies. Small, light-weight towers are examples of these types of products.

Table 18. Dell Enterprise Category 1, "Table-top in Office Environment" acoustical specification category.

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)			
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required	Simulate (that is, set fan speeds representative) for Idle at 28° C & 35° C Ambient, and for 100% loading and maximum configuration, at 35° C Ambient
Sound Power	LWA,m, B	≤ 4.2	≤ 4.7	≤ 5.0	Report
Sound Quality (both positions must meet limits): Front Binaural HEAD and Rear Microphone	Tones, Hz, dB	No prominent tones per criteria D.10.6 and D.10.8 of ECMA-74			Report tones
	Tonality, tu	≤ 0.35	≤ 0.35	≤ 0.35	Report
	Dell Modulation, %	≤ 35	≤ 35	≤ 35	Report
	Loudness, sones	Report	Report	Report	Report

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)			
		Standby in 23±2° C Ambient	**Idle in 23±2° C Ambient**	**Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required**	**Simulate (that is, set fan speeds representative) for Idle at 28° C & 35° C Ambient, and for 100% loading and maximum configuration, at 35° C Ambient**
	LpA-single point, dBA	Report	Report	Report	Report

Front Binaural HEAD	Transients	● Oscillation (see AC0159), if observed, during 20-minute steady-state observation, must adhere to the following two criteria:
		  ○ Max. {ΔLpA} < 3.0 dB
		  ○ Event count < 3 for "1.5 dB < ΔLpA < 3.0 dB"
		  ○ Acoustical Jump (see AC0159), during air mover speed transition from Idle to Operating Mode must be ≤ 15 dB.
		● Startup behavior
		  ○ Report Startup behavior re. AC0159
		  ○ Startup must proceed smoothly, that is, no sudden or large jumps, and fan speed during startup must not exceed 50% of its maximum
		● Transient inputs: Report time-history sound pressure levels re AC0159 "Train of Step Functions on Processor"
					N/A

Any	Other	No rattles, squeaks, or unexpected noises Sound should be "even" around the EUT (one side should not be dramatically louder than another) Unless otherwise specified, the "default" thermal-related settings shall be selected for BIOS and iDRAC. Specific operating conditions will be defined in "Configurations & Configuration Dependencies" for each platform.			
Sound Pressure	LpA-reported, dBA, re AC0158 and program configuration document	Report for all mics	Report for all mics	Report for all mics	Report for all mics

Category 2: Floor-standing in Office Environment

When Dell determines that a specific Enterprise product is to be used primarily when it is sitting on the floor, that is, next to a user's feet, then the acoustical specification in the table below applies. Noise from the product should not annoy or otherwise interfere with the user's thoughts or speech, for example, on the telephone.

Table 19. Dell Enterprise Category 2, "Floor-standing in Office Environment" acoustical specification category

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)			
		Standby in 23±2° C Ambient	**Idle in 23±2° C Ambient**	**Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required**	**Simulate (that is, set fan speeds representative) for Idle at 28° C & 35° C Ambient, and for 100% loading and maximum configuration, at 35° C Ambient**
Sound Power	LWA,m, B	≤ 4.9	≤ 5.1	≤ 5.4	Report
Sound Quality (both positions must meet limits): Front Binaural HEAD and Rear Microphone	Tones, Hz, dB	No prominent tones per criteria D.10.6 and D.10.8 of ECMA-74			Report tones
	Tonality, tu	≤ 0.35	≤ 0.35	≤ 0.35	Report
	Dell Modulation, %	≤ 35	≤ 35	≤ 35	Report
	Loudness, sones	Report	Report	Report	Report
	LpA-single point, dBA	Report	Report	Report	Report

Front Binaural HEAD	Transients	• Oscillation (see AC0159), if observed, during 20-minute steady-state observation, must adhere to the following two criteria:
		  ○ Max. {ΔLpA} < 3.0 dB
		  ○ Event count < 3 for "1.5 dB < ΔLpA < 3.0 dB"
		• Acoustical Jump (see AC0159), during air mover speed transition from Idle to Operating Mode must be ≤ 15 dB.
		• Startup behavior
		  ○ Report Startup behavior re. AC0159
		  ○ Startup must proceed smoothly, that is, no sudden or large jumps, and fan speed during startup must not exceed 50% of its maximum
		• Transient inputs: Report time-history sound pressure levels re AC0159 "Train of Step Functions on Processor"
					N/A

Any	Other	• No rattles, squeaks, or unexpected noises • Sound should be "even" around the EUT (one side should not be dramatically louder than another) • Unless otherwise specified, the "default" thermal-related settings shall be selected for BIOS and iDRAC. • Specific operating conditions are defined in "Configurations and Configuration Dependencies" for each platform.			
Sound Pressure	LpA-reported, dBA, re AC0158 and program configuration document	Report for all mics	Report for all mics	Report for all mics	Report for all mics